Sample 1

Teaching (40%)

Expectations:

Dr. [redacted] has been heavily involved in developing the department's Physical Science 100 (PS100) course. It is anticipated that this involvement will continue in the future. Specific teaching expectations include

1. Fulfilling a typical faculty teaching assignment in the Department of Physics and Astronomy. Recent assignments consist of 3 to 4 classes per year, with variances determined by department need or by assignment from the department chair. It is anticipated that courses taught will primarily consist of PS100 and astronomy lab classes.
2. Responding appropriately to recommendations and guidance from the department chair.
3. Managing PS100 or its replacement.
    a. Managing and training the teaching assistants
    b. Developing course content including online content
    c. Assessing the effectiveness of current teaching strategies
    d. Proposing modifications to achieve course learning outcomes

Objectives: The primary objective is to support the university in its AIMS specifically targeting the General Education science goals. The items from the current version of the AIMS documents that specifically pertain are fond in the "Skills" and "Breadth" portions of the document.

- *Sound thinking* — The PS100 course, and any successor must help build scientific reasoning skills. Continued efforts to assess and improve reasoning will be an important part of course development. Courses should show improving student gains in reasoning ability.
- *Effective communication* — The PS100 course, and any successor will support the university's efforts to improve communication skills by requiring students to engage in a variety of written and verbal communication and assessing the students on their performance.
- *Quantitative reasoning* — The PS100 course, and any successor will build quantitative reasoning skills. The course will specifically target proportional reasoning and creating and interpreting graphical representations of numerical data.
- *Science* — The PS100 course, and any successor will teach the basic concepts of the physical sciences and the power and limitations of the scientific method- when possible we will do so using hands-on, experiential learning activities.

Current assessment:

Scientific reasoning

We've been using standardized tests to measure gains in scientific reasoning. The LCTSR consists of 24 items intended to assess scientific reasoning, including the skills of hypothetico-deductive reasoning, control of variables, quantitative reasoning, graphing, and data analysis. We have administered this instrument as a pre-post test for the past several years to all students enrolled in PS100. Our students typically begin the semester with a score of about 17 and end with a score of about 19. For example, one section from Fall 2019 showed an improvement from 17.27 to 19.26 [$t(1,233) = 8.354$, $p<0.001$, $d=0.461$]. These gains are statistically significant and represent a small effect size.

We believe that these modest gains in scientific reasoning result from the evidence-based pedagogy used in the course. During weekly breakout sections supervised by undergraduate learning

assistants, students engage in scaffolded mini-experiments and problem-solving activities where they are asked to identify a claim being tested, what measurement they are making to test it, predict the outcome, observe results, and reach a conclusion. These activities are designed around the broad scaffolding of the scientific method promoted by Lawson (2000) and Rubbo & Moore's (2012). As part of our ongoing efforts to improve reasoning, we're looking at new pedagogy (DBL) and new assessment tools.

Effective Communication – While writing is included as a portion of the course, and some training is provided to TAs on how to coach students in writing, nothing has been done to measure the effectiveness of the assignments.

Science Content – Student performance on a variety of assessments is tracked. Continued efforts to improve instruction as measured on both course exams and standardized instruments takes place.

Managing and training the TAs. TAs are hired on a word of mouth basis. There are regular weekly training meetings that focus on 1. Content, 2. Grade norming. The training meetings are informal, seat of the pants, and little effort is made to measure the effectiveness. Initial steps were made to implement an evaluation and feedback system for TAs to help improve the quality of instructions. This was waylaid by Covid and needs to be restarted.

Goals:

Short term1-3 years:

1. Decisions about course structure post-covid. What aspects of the flipped course will be kept, which will be replace?. How will we provide students with hands on, authentic learning opportunities going forward?
2. Online content – continue to improve online material vs learning objectives vs assessments
    a. Look at DBL results and refine course content.
    b. Taylor homework activities to target scientific reasoning and content objectives.
3. Modularize content where possible to make it easier to reconfigure as needed for GE changes.
4. Work on personal teaching goals. Improve live presentation skills.
5. Work with [redacted] others to develop TA training. Come up with a systematic TA training scheme that provides appropriate "carrots and sticks" for participating, allows for personal development for the TAs, and provides them with meaningful and actionable feedback on their performance.
6. Figure out student mentoring – how much is "TAs," tracking at risk first years, guidance for research projects.

Long term 3+ years:

1. Long term planning for PS100 is on hold until the university determines the shape of the GE.
2. *Long term planning for TA training*:, I would like our program to provide opportunities and experience that engages and enhances our teacher training program. I would like to be part of the national conversation, and be in a position to provide experience and training resources to other institutions.

Professional Assignment (40%)

Expectations:

Dr. [redacted] has served as the planetarium director in the Department of Physics and Astronomy. It is anticipated that this will continue in the future. Specific planetarium expectations include

1. Managing the physical aspects of the planetarium and Physics 127 telescopes
2. Developing planetarium content for classroom and public settings
3. Developing methods for assessing effectiveness of the presentations and content in meeting desired learning outcomes
4. Training and mentoring student assistants to operate and manage the planetarium and present planetarium shows

Objective: The planetarium needs to support the mission of BYU. It is a unique space the provides visualization opportunities that can enhance current student and life-long learning.

1. Explore the affordances of the technology to identify ways in which the modality can enhance student learning in both astronomy and other disciplines.
2. Develop evidence-based content that leverages the affordances and provides documented, measurable student gains.
3. Train faculty and TAs to make the facility easily accessible.
4. Provide opportunities for both BYU students and the general community to engage in informal science education through public programs.

Current assessment:

We just completed installing the updated system. Old content has been copied onto the servers. Most content still needs to be re-rendered at higher resolution and installed on the new system.
I would currently classify the space as underutilized. The use of the planetarium by astronomy faculty is currently a mixed bag. Some use it extensively, and for others, it is as low as once a month. Outside of astronomy faculty almost never use it. While I've done no formal study, the barrier appears to be the "ease of use". While there are existing animations and content, it is organized primarily for a single, high use, instructor. Others don't have the information organized in a way that makes it simple to integrate content into existing course structure.
The training course exists and is reasonably well developed. It is structured as a mastery, experiential course. The material needs to be updated to better cover the new software, and to cover the new deck telescopes.
Due to covid, the public shows have been halted. Those should resume by Fall.

Goals:

Short term1-3 years:

1. Planetarium upgrade
    a. See old content moved, organized, and uploaded to the new system.
    b. Re-render old content at higher resolution.
    c. Develop new content to support 127.
    d. Develop new content for 313R.
2. Telescopes
    a. Develop new content for 313R to allow TAs to use the deck telescopes in 127.
3. Restart public shows
4. Present content at conferences and make content available through online sharing platforms.

Long term 3+ years:

Build a consortium developing and testing content for use in educational settings.

Citizenship (20%)

Expectations:

Dr. [redacted] has served well as a member of the PS100 and planetarium committees and has fulfilled other citizenship assignments. It is anticipated that this will continue in the future. Specific citizenship expectations include
Dr. Lawler's citizenship expectations will include

1. Serving as a member of the PS100 committee or its replacement in the future
2. Serving as a member of the planetarium committee.
3. Serving other committees as assigned.
4. Hosting planetarium programs for the public.
5. Engaging in professional citizenship.

While this position has no research assignment, it is expected that Dr. [redacted] will continue to be aware of and actively apply current pedagogical techniques to improve PS100 and planetarium effectiveness. This may include

1. Attending academic conferences
2. Giving presentations at academic conferences
3. Publishing findings, when such publications contribute to PS100 and planetarium effectiveness
4. Effective mentoring of student assistants on assessment activities
5. Collaborating with education-focused teachers and/or researchers to develop assessment instruments
6. Participating in internally and/or externally funded grants to develop and improve physical science and planetarium pedagogy when participation does not detract from core responsibilities
7. Collaborating with department members to improve teaching effectiveness

Objective: Build and strengthen BYU as an institution by actively fostering relationships with other faculty members, members of the discipline beyond BYU, and the individuals in the local community. Use university committee memberships to directly support the institution. Contribute to the national dialogue through participation in professional associations. Create informal science learning opportunities that benefit the surrounding communities and provide service opportunities for students.

Current assessment:
Currently serving on several department level and university level committees.
Active in both AAPT and IPS, but constraints on travel have limited participation. Have attended digistar user group meetings, but have not contributed to the community.
While "outreach" is on hold, we have an established program to provide planetarium shows to the general public and to local youth groups.

Goals:

Short term1-3 years:

1. BYU
    a. Department committees
    b. University committees
2. Professional organizations

a. More active in IPS, especially local group. Michelle has been the driving force, and she just retired. Make sure that the ball doesn't get dropped.
b. DUG, be more active, travel in the US, contribute content regularly to cloud and group
c. AAPT – look for opportunities for more committee involvement.
d. Look at the benefits of additional professional groups specifically APS, AAS.

3. Community outreach – Re-implement the public planetarium shows and star gazing nights.

Long term 3+ years:

1. Professional organizations
   a. "PHET" for planetariums? I'd love to see a center with evidence-based content for teaching using a planetarium.
   b. Develop collaboration with animation, perhaps pursue Native American star stories project.

2021 specific action items

Teaching

1. The BYU Online version of PS100 will be fully developed and transitioned to work from within Canvas by the end of 2021.
2. I will incorporate new deck telescopes into 313R during Fall 2021.

Professional

3. I will oversee the Planetarium upgrade during Summer 2021, and transition all educational content to the new system in time for faculty use Fall 2021.

Citizenship

4. I will participate in the Digistar Users Group, and begin contributing BYU's content to the shared content site.
5. I will Present PS100 PER research at AAPT
6. I will conduct some "talk-alouds" with PS100 online content
7. I will actively and meaningfully contribute to department and university committee assignments (Astronomy Facilities, Teaching Improvement, PS100, and University Accreditation)
8. I will create a faculty development plan that will allow me to put together a Professor portfolio in five years.

Sample 2

New Faculty Series – Faculty Development Plan

Fall 2021 – First Draft

Professional Faculty Responsibilities and Goals

Fall 2021 – Electron Microscopy Facility:

The Electron Microscopy Facility supports the research efforts of BYU Faculty and Students. In order to facilitate such efforts, the following goals are set for Fall 2021:
(These are related to both Scholarship and Citizenship requirements)

A) Compile a list of resources and capabilities related to electron microscopy. (Project 1)
   1. Those that are available within our current facility
   2. Those available within campus
   3. Additional/complementary resources available within a short traveling distance. (e.g. Core facilities at UofU, USU, etc.)

B) Engage with faculty currently utilizing our facility:
   1. To better understand the research currently being performed within the microscopy facility.
   2. Will provide opportunities and guidance for these faculty members
   3. To promote better understanding of the capabilities we provide and how we may collaborate to enhance the research currently taking place.
   4. Propose electron microscopy projects within these faculty's research umbrella that may serve as capstone / thesis project for both undergrad/grad students
   5. Determine what capabilities are desired from the faculty that the facility does not currently offer. – This list of desired capabilities will provide the grounds for future development.
   6. Advice/Mentor students

C) Find opportunities to promote the services provided by the Facility
   1. Find at least two venues this year in which to promote our tools and capabilities to a wider BYU audience
   2. Within the Colleges of Physical and Mathematical Sciences, Engineering, and Life Sciences, present at least once in a department colloquium/seminar

Teaching

Fall 2021: PHSCS588 – Scanning Electron Microscopy

This course has not been offered at BYU since Fall 2018. As it currently stands, this course needs to be re-developed. This is an introductory course into electron microscopy. Under its current condition, one semester is not enough to cover all of the techniques available for scanning electron microscopy. With this in mind, there are still several goals to achieve for the course by the end of fall 2021
(Syllabus for the class is included further down in this document)

A) Course goals:

1. Students will be exposed to the equipment and techniques available from the facility
2. The students will show proficiency in several imaging and analytical techniques
3. As a form of experiential learning, the students will carry out an electron microscopy-related research project from inception up to completion utilizing the facility's available resources.
4. Upon completion of their research project, the students will carry out a poster presentation of their research to their peers and selected faculty.
5. While there is a time constrain forbidding all students from becoming proficient in all available techniques, the students will be familiar with several of them throughout the course.

B) I will work with the department's rank and status committee to schedule peer-review sessions and attain feedback on the course and on my teaching.

1. At least three peer-reviewed sessions will be included: Near the beginning of the course, Mid-term, and towards the end.
2. In each of these peer-review sessions I intend to gather feedback from my peers and implement it, when appropriate, prior to the next peer-review session.

C) I find student feedback crucial during my teaching. As such, the following methods will be employed to get their ongoing feedback.

1. Foster an atmosphere of student-teacher communication.
2. Directly ask for feedback from the students. (Both in class, as well as through online surveys, anonymously, etc.)

D) Utilize my teaching assistants and seek their ongoing feedback.

1. Students sometimes may prefer to communicate through TA's.

2. Having the course's teaching assistants in class allows them to observe the students' reactions/demeanor during class. These observations may provide valuable feedback to shape the development of the course.

E) Finally, the CLT has several resources available. During this course, I will make a list of resources that will be beneficial for the next course where the CLT may provide guidance/resources.

Additional Citizenship Responsibilities and Goals

Department Citizenship

My CFS status falls under the purview of the Physics and Astronomy Department.

A) Member of the undergraduate committee:

1. Among the various duties within this committee, one of my goals here is to help mentor a group of new students to the department. This involves me learning the physics undergraduate program at BYU in order to provide sound advice to the students.

B) Undergraduate Student Mentorship: As a member of the PandA department, I have the opportunity to mentor undergraduate students in the department with research activities for their senior thesis project. Goals for the Fall of 2021:

1. I have two students that will be completing their research withing a few months. One of them plans to graduate this December. My goals is to mentor him as to help him achieve that goal

2. During the Fall semester I intend to recruit two more students to continue the current projects.

C) Engage with the Physics Faculty to increase utilization of the microscopy facility, facilitate their research, and collaborate with them.

1. By the end of fall 2021, I intend to engage with members of the Condensed Matter and the Atomic-Molecular-Optical groups to learn their research and propose at least two projects that will benefit their research through the electron microscopy facility.

University Citizenship

As the director of the microscopy facility, it is incumbent upon me to interact with various colleges. Below are several

A) BYU Microscopy Committee: (goal: Increase involvement from the microscopy committee)

1. Provide facility updates to the Microscopy Committee at least once every two months.

    1. Report the status on utilization, needs, progress on various ongoing projects, etc.

    2. Get the committee involved in finding solutions to the facility's needs
2. Meet with the Microscopy Committee Chair at least twice a month
    1. Outline the goals of the facility, provide and receive accountability of the facility, and express the areas where the committee's actions are needed.

B) Deans of CPMS / Engineering / LS:
(goal: Increase the rate at which the colleges are updated of their usage)

1. The aforementioned colleges subsidize the facility's equipment. As such, they should be kept up-to date on the utilization of the equipment, as well as to how much their college is benefiting from the usage. The goal is to give a monthly report on these activities to each of the colleges.
2. Start reporting on what projects / faculty / students their college is supporting (in conjunction with the professional faculty goals above)

C) Work with the University's Office of Research Development to help enable research activities for BYU faculty and students. (again, in conjunction with the professional faculty goals above).

1. The Office of Research and Development is a resource that can help make the connections needed between faculty / funding / on-campus-research-resources. The goal here is to learn and utilize this resource and also to put the facility at its service.

D) Materials Science Minor –

PHSCS588 Syllabus

Available at: https://max.byu.edu/20215-phscs588/syllabus

Course Information

Description

Physics 588 is an introductory course to Scanning Electron Microscopy. Students are expected to learn to use the scanning electron microscope (SEM) and several associated analytical tools for the characterization of inorganic and/or organic material samples. The students are exposed to basic theoretical aspects of the SEM, X-ray energy dispersive spectrometry (XEDS), electron back-scattered diffraction (EBSD), low-vacuum operation, sample preparation, and other techniques.

Prerequisites

The students are expected to have completed the basic SEM training prior to the beginning of class. The basic training for the SEM consists of a few online training videos and several "hands-on" sessions on one of our three scanning electron microscopes with either [redacted] in the McDonald building (MB) OR [redacted] in the underground lab facility of the Eyring Science center (ESC). Please go through all the videos and then contact [redacted] or [redacted] depending on the microscope for which you want training, and let them know you have completed the training videos. Let them know if you are registered for the SEM class.

Permission-to-add code can be obtained in person by contacting Dr. [redacted]

- Due to the limited space in the course, a small interview will be requested to discuss the purpose and scope of the class, as well as the student's motivation for taking the course.

Recommended (but not required) courses:

- Electricity and Magnetism (PHSCS220 or higher); Modern Physics (PHSCS222 or higher); Solid State Physics; (PHSCS281 or 581); Experimental Methods in Physics (PHSCS145 or similar)

Instructors' Contact Information

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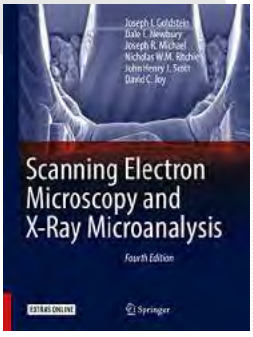
Materials



Required Text:
Scanning Electron Microscopy and X-Ray Microanalysis by Goldstein, J
(link to BYU's bookstore)

The class textbook is also available as a download from the Harold B. Lee Library:
https://link-springer-com.erl.lib.byu.edu/book/10.1007/978-1-4939-6676-9
(Download accessible within BYU campus' network)

$129.00

Learning Outcomes

Purpose of the Course

The purpose of this course is to teach students to use the scanning electron microscope (SEM) and several associated analytical tools for the characterization of inorganic and/or organic material samples. The students are exposed to basic theoretical aspects of the SEM, X-ray energy dispersive spectrometry, electron back-scattered diffraction, low-vacuum operation, sample preparation, and other techniques.

Proficiency in basic SEM operation

Lab-based: The student will show proficiency in basic SEM operation. Skills comprise:

1.Sample loading and unloading
2.Proper selection of imaging conditions for the specimen
3.Adequate image acquisition (e.g. focus and stigmatize)

Overall knowledge on SEM analytical techniques

Class-based: The student will be familiar with several imaging and analytical techniques available for scanning electron microscopy. For example:

•secondary electron imaging
•back-scattered electron imaging
•x-ray energy-dispersive spectrometry
•electron back-scattered diffraction
•cathodoluminescence
•voltage contrast
•stage biasing
•others

Proficiency in at least one analytical technique for the SEM

Lab-Based - the student will demonstrate proficiency in at least one of the above-mentioned techniques available in our SEMs.

Grading Policy

In addition to the coursework and assignments given during the course lectures, there will be a significant portion of time dedicated to hands-on equipment utilization during the lab sections. The lab sections may be conducted on the scanning electron microscopes in the underground lab facility of the Eyring Science Center as well as in the microscopy lab in the McDonald building. It is expected that the students will learn to perform basic and more advanced imaging and analytical techniques on the instruments.

Students will be required to attend lectures and labs, participate in classroom discussion and complete lab work, lab write-ups, reading questions, a midterm and final exams.

Reading Assignments = 8%
Weekly lab reports = 8%
Project Proposal = 10%
Midterm Lab Imaging Report = 10%
Midterm Exam = 15%
Final Lab Report = 18%
Final Lab Presentation = 10%
Final Exam = 18%
Participation/Attendance = 3%

Attendance Policy

Full attendance is expected for lectures in order to motivate in-class discussion.

Equipment time will be blocked off for the duration of the semester for each section of the course. The students are expected to communicate which piece(s) of equipment is (are) expected to be in use a week in advanced. This may be communicated via the

weekly lab report. When needed, additional time may be scheduled by sending a request to [redacted] so that the microscope time can be billed to the course.

Microscope availability will be allocated in a first-come-first-served basis.

Grading Scale

Grades	Percent
A	93%
A-	90%
B+	87%
B	83%
B-	80%
C+	77%
C	73%
C-	70%
D+	67%
D	63%
D-	60%
E	0%

Teaching Philosophy

I consider myself, this lab, and this course as resources in your pursuit of education. As such:

- I'd place the onus on me to:
    - not compromise the content this course covers such that you may attain the skills you will need to succeed outside of academia
    - be well-prepared to provide the information you need or at least point you in the right direction to find the answer
    - ensure the lab resources are adequate to meet your needs
    - add enough flexibility to the course to build on your interests
    - share of my experiences that you may benefit from them
- I'd place the onus on you to:
    - be proactive in seeking the time to utilize the tool
    - take ownership of the material for this course
    - seek out help when needed

In my opinion, scanning electron microscopy is as much a scientific tool, as it is a skill/art. While the science ensure the reproducibility of the results, attaining the skills only comes from consistent practice at the tool.

Meeting with CLT consultant (Met 10Sep2021 with [redacted]

These are the topics discussed after the consultation with regards to PHSCS588

Background

- What rationale has the department provided for offering this course? This is the only course available for utilization of electron microscopes in campus.
- Which program outcomes are supported by this course? Students are expected to learn to use the scanning electron microscope (SEM) and several associated analytical tools for the characterization of inorganic and/or organic material samples. The students are exposed to basic theoretical aspects of the SEM, X-ray energy dispersive spectrometry (XEDS), electron back-scattered diffraction (EBSD), low-vacuum operation, sample preparation, and other techniques.
- What BYU AIMS are supported by this course? PHSCS588 is a very practical course. It supports BYU's mission by providing a unique and enhanced educational experience for the students. This course is offered for both undergraduate and graduate students. Few institutions provide this type of experience.
- What type of students enroll in this course? This course is geared to upper level undergraduates and graduate students whose research requires the use of a scanning electron microscope. (Nonetheless is it open to any BYU student)
- How has this course been taught in the past? Previously, as a laboratory course, there were several "canned labs" that the students performed. However, this course has not been offered in several years.

Method

- **Course Purpose:** In a single sentence, what were the students expected to know, feel or do by the end of this course? The students will be and feel proficient in utilizing scanning electron microscopes to image and analyze a variety of samples.
- **Culminating Assessment:** How did you assess student achievement of the course purpose (Final Exam or Project)? The class part of the course involves a final exam where the students will demonstrate knowledge common to scanning electron microscopy and several micro-analytical techniques. In the lab, the students will carry out a self-directed research where the scanning electron microscope is crucial. They will present a small poster session showcasing their expertise and the results of their project.
- **Learning Outcomes:** What learning outcomes were students asked to achieve in order to accomplish the course purpose?
    - Class-based: The student will be familiar with several imaging and analytical techniques available for scanning electron microscopy. For example: • secondary electron imaging •

back-scattered electron imaging • x-ray energy-dispersive spectrometry • electron back-scattered diffraction • cathodoluminescence • voltage contrast • stage biasing • others

- Lab-based: The student will show proficiency in basic SEM operation. Skills comprise: 1. Sample loading and unloading; 2. Proper selection of imaging conditions for the specimen 3. Adequate image acquisition (e.g. focus and stigmatize); 4. at least one of the aforementioned analytical techniques.

- **Progress Checks:** How will you & your students know during the course of the semester if your they are on the right track. These progress checks should be aligned with learning outcomes and course purpose.
  Project: At the beginning of the semester, the students will submit a proposal of their intended research, along with a proposed timeline for their progress – Feedback will be given regarding the viability of the proposal, and at most half will be accepted.
  On a weekly basis, students will submit a report outlining their progress – Feedback will be provided, along with additional training when needed.
  Coursework: In class students are given a list of topics that will be covered. Through the use of max.byu.edu students and I can track their progress in those topics. Reading assignments are given for each class period, and discussed in class (where feedback is given as part of the lecture)

- **Learning Activities:** Describe a typical week in your class including what they do before, during and after class. Describe how the activities of this particular week prepare students to perform at a high level on the next progress check.
  **Lab periods – Students get to receive training/practice in the microscopes and advance in their projects. The laboratory staff is available during this time to help the students with any immediate needs, nonetheless, students are encouraged to self-direct their learning/practice and ask for specific training on advanced techniques when needed.
  In their weekly lab report, students summarize the progress made during that lab section, what learning or practice took place, what results were obtained, what plans they have for the following week, and what help/feedback they need or what issues they had.
  **Lectures (twice a week) – Students are exposed to the theory behind their lab practices. An ongoing (informal) assessment takes place via reading questions that are due before class starts. The results from the reading questions helps guide the discussion on the theory. Lecture is also an adequate time for the students to bring up questions that may help clarify observations made in the lab for the benefit of the other classmates.